

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

WALDREN, Robin, Michael
Marks & Clerk
57-60 Lincoln's Inn Fields
London WC2A 3LS
ROYAUME-UNI

Date of mailing (day/month/year) 16 August 1999 (16.08.99)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 545P77498	
International application No. PCT/GB98/02152	International filing date (day/month/year) 20 July 1998 (20.07.98)

1. The following indications appeared on record concerning:

☒ the applicant

 ☐ the inventor

 ☐ the agent

 ☐ the common representative

Name and Address

 RADIOSCAPE LIMITED
 34 Mornington Crescent
 London NW1 7RE
 United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person

 ☐ the name

 ☐ the address

 ☐ the nationality

 ☐ the residence

Name and Address

 OTIC LIMITED
 34 Mornington Crescent
 London NW1 7RE
 United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

 The International Bureau of WIPO
 34, chemin des Colombettes
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Authorized officer

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PATENT COOPERATION TREATY

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M.H

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

WALDREN, Robin, Michael
Marks & Clerk
57-60 Lincoln's Inn Fields
London WC2A 3LS
ROYAUME-UNI

Date of mailing (day/month/year) 19 January 2000 (19.01.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 545P77498	
International application No. PCT/GB98/02152	International filing date (day/month/year) 20 July 1998 (20.07.98)

1. The following indications appeared on record concerning:		
<input checked="" type="checkbox"/> the applicant	<input type="checkbox"/> the inventor	<input type="checkbox"/> the agent <input type="checkbox"/> the common representative
Name and Address OTIC LIMITED 34 Mornington Crescent London NW1 7RE United Kingdom	State of Nationality GB	State of Residence GB
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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:		
<input type="checkbox"/> the person	<input checked="" type="checkbox"/> the name	<input checked="" type="checkbox"/> the address <input type="checkbox"/> the nationality <input type="checkbox"/> the residence
Name and Address TVCOMPASS.COM LIMITED 5 Burstock Road London SW15 2PW United Kingdom	State of Nationality GB	State of Residence GB
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to:		
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned	
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned	
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:	

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Simin Baharlou
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 30 March 1999 (30.03.99)	
International application No. PCT/GB98/02152	Applicant's or agent's file reference 545P77498
International filing date (day/month/year) 20 July 1998 (20.07.98)	Priority date (day/month/year) 18 July 1997 (18.07.97)
Applicant FERRIS, Gavin, Robert et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
18 February 1999 (18.02.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer C. Carrié Telephone No.: (41-22) 338.83.38
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Communication System and Method

The present invention relates to a communication system and method. The invention further relates to a transmitter apparatus and a receiver apparatus for use with the system and to a subscriber apparatus for communicating with at least one of the transmitter and receiver apparatus.

The invention may be applied to the field of remote control units for consumer broadcast receivers, including television and radio receivers. The invention relates to the display of (possibly programme-related) information, advertising, and product and service offers on said remote control units. The invention provides use of said units to allow consumer response to the said displays, particularly but not exclusively where said response involves the purchase of said products and services so offered.

It is commonly known in the advertising, sales and marketing arts that users are much more likely to initiate an impulse purchase of information, products and services (collectively, 'offerings') if :

- 1) they are induced to think about said offerings in a positive manner shortly prior to the offer of sale,
- 2) an offer of sale is, in fact, made and
- 3) it is fast and easy for users to place orders for such offerings, once the offer of sale has been made.

Broadcast media, such as television and radio, often satisfy the first condition for many offerings. For example, upon hearing a track from an album on the radio on the radio, a listener will commonly wish to purchase that album. Similarly, upon watching a cookery programme on television, a viewer may wish to purchase a bottle of wine

reviewed therein. Indeed, condition 1) forms a key premiss of many television shopping channels, infomercials and commercials in the United States and elsewhere.

Unfortunately, however, condition 2) is often unsatisfied, as, for example, when a radio station does not broadcast the name of the artist and album of the current song, or where (as in the cookery programme example) there is no provision to phone in orders (which is a costly enterprise for the broadcaster to maintain). Many commercial opportunities to make a sale are lost in this way.

Furthermore, even when 1) and 2) are satisfied (as with a television shopping channel), it is usually the case that 3) is not. Users who might initially be keen to purchase an offering become less so when such purchase involves location of a credit card, phoning up, waiting in an answering system, and then having to give a number of lengthy details. Lack of convenience acts as a strong barrier to sales.

Various solutions have been proposed in the art to the various problems of 1), 2) and 3). However, a good, economical solution has not yet been offered to all three.

U.S. Pat. No. 5,410,326 (Goldstein) describes the use of a universal remote control device with a built in display on which advertisements can be shown. The system does allow purchasing; however, this requires the use of a phone modem, which is highly inconvenient, and also, since the system connects directly to the sponsoring party, may require direct data handling for which that party is not equipped. Furthermore; downloading data into the device requires either the use of the said modem, a set-top box adaptor (to gain access to in-band or out-of-band Programme Associated Data (PAD)), an optical device to 'read' information off the television screen, or an audio device to detect information hidden in audio signals. The disadvantage of using the phone modem to download PAD is clear, in that a call must be made, which is inconvenient, and since there is both a limited memory in the device (limiting the amount of static information which can be downloaded) and occasions when the PAD will be highly volatile and not known ahead of time (as with sporting events), the

solution is not general. The disadvantages of using a set-top box, namely cost and complexity, are easily understood, as are the difficulties suffered by 'data-hiding' or visual indicia systems (low code rate, low reliability). Therefore, while this device has some promise, it must fall down in being manifest either as a workable but very expensive unit, or a mid-priced but less than useful one.

It is, accordingly, an object of the present invention to provide an economical channel for at least one of outgoing or incoming information, avoiding the disadvantages of the channels currently in use in the art, for the transmission of interaction data to or from the instant device.

According to a first aspect of the present invention, there is provided a communications apparatus comprising means for determining whether a broadcast receiver is receiving a particular channel, the apparatus further comprising receiving means for receiving a signal, means for displaying information in response to a signal received by the receiving means, means responsive to a user input to provide an outgoing signal and transmitting means for transmitting the outgoing signal, wherein at least one of the receiving means and the transmitting means is for communicating by radio with a remote station responsive to outgoing signals from a plurality of communications apparatus.

According to a second aspect of the present invention, there is provided a transmitter apparatus comprising means for storing information concerning transmission from a primary broadcaster, means for transmitting the information and means for synchronising the transmission of information to at least one transmission from the primary broadcaster, wherein the means for transmitting information transmits distinct from the primary broadcast chain.

Looking generally at the issue of presenting programme-related offerings to a user via an apparatus, one can see that there is a need to have an outbound channel, holding the programme-associated data, which is broadcast to the user in parallel with the

programme channel, and which is picked up by the said apparatus. However, as we have seen, current mechanisms for sending offering-related PAD requires that the data be sent in the same medium as the programme, which in turn requires either a costly set-top box decoder, an unreliable (and broadcaster-tied) 'data-hiding' decoder, or the duplication of the receiver circuitry in the receiver, which would also be very expensive. Broadcast of PAD using other channels either has significant drawbacks (as with the use of telephone channels, which are inconvenient, non-broadcast, and not amenable to 'real-time' PAD), or has not yet been applied to the distribution of offering-related PAD (as with the systems which use the pager network as a transport).

The present invention may further provide an offering-related PAD broadcast channel which can be received by a device without the use of a set-top box, telephonic modem, or other external inconveniences, and which does not rely upon to co-operation of anyone in the primary broadcast chain to insert information (whether using out-of-band, in-band, using data hiding or otherwise) into the programme broadcast medium.

Similarly, it may be appreciated that such a device, if it is to allow useful purchasing and information request actions by customers, must supply a (relatively low-capacity), real-time back (or return) channel, to allow interaction data to be conveyed to the sponsoring party. Such a back channel must be initiated on a individual basis, as opposed to the broadcast nature of the outbound channel. Existing systems rely on back-channel paths which are either inconvenient (for example, telephonic modems), require the use of a costly set-top unit (for example, those which exploit the cable system as a return path), or are not 'real time' or close to 'real time' (as with systems which must be taken to a 'downloading' point to extract any interaction data stored in them). Current systems also connect the back channel of the user's system directly to the sponsoring party, thereby requiring that the latter be equipped with whatever handling equipment may be necessary; another potential hurdle to take-up.

Notice that such a device, if it is to be generally useful, must be able to receive PAD items in an ongoing feed. There are two main reasons for this. First of all, the fact that

any reasonably-priced embodiment of such a device can have only a modest amount of onboard memory, places a limit on the number of PAD items that can be downloaded to it in any given batch mode transfer. Second, for certain events, such as televised live horse races, the outcome is not known in advance, and so neither, a fortiori, is the content of any event-related PAD. Such PAD cannot, therefore, be downloaded in advance of the event using a batch mode transfer.

These two factors, namely limited buffer memory in the device, and the dependence of certain PAD items on live events, means that the ongoing feed of PAD to the device must take place in "real time" or close to "real time". "Real time" feed is required in the second scenario mentioned, where PAD content is contingent upon an event, the outcome of which is unknown until the time of broadcast. Once the event in question is determined (for example, a particular horse wins the race), the relevant PAD may be constructed and is then immediately due for presentation to interested users. Ideally, as little additional delay as possible is incurred from this point on; hence the term "real-time". Near "real-time" feed is required in the first scenario, where PAD items transmitted to the user device must be relevant to a primary broadcast within the near future, if buffer overflow in the device is to be avoided.

The present invention allows the passage of such data to sponsoring parties to be indirected via a central processing station and require only the use of standard, well-known protocols for any communication between said central processing station and said sponsoring parties.

The present invention may further allow the presentation to users – through a cost-effective, single device – of programme-associated data, particularly where such PAD constitutes an offering, and to allow the user to express interaction with the PAD through the device, particularly where such interaction consists of the purchase of said offerings.

The present invention may further allow such PAD to be 'real-time' or 'near real-time', and for the interaction data to be conveyed back to the sponsoring party in 'real-time' or 'near real-time'.

The present invention may further provide a solution to the problem of satisfying conditions 2) and 3) mentioned above, (given that condition 1) is already satisfied by the primary broadcast material), in the form of a simple user device, a plurality of which may be in operation at any time, remote adaptor station or stations, and methods.

In accordance with the aforementioned and other objects of the invention, a brief summary of the present invention is given. Some simplifications and omissions may be made in the following summary, which is intended to highlight and introduce some aspects of the present invention, but not to limit its scope. Detailed descriptions of a preferred and other exemplary embodiments adequate to allow those of ordinary skill in the art to make and use the inventive concepts will follow in later sections.

The present invention provides apparatus and method for providing simple, efficient and economic display of advertisements, product and service offers, and other information (collectively, 'display data') to the users of broadcast receivers, and is intended to have particular application where said display data is related to the programmes picked up by such receivers. The invention also provides apparatus and method for users, where applicable, to interact with said display data (for example, to order an offered product, or to request more information about an advertised good or service), and for the details of such interaction (collectively, 'interaction data') to be sent back to the sponsoring party for processing.

The apparatus, for example a remote control can determine whether a channel is selected on a broadcast receiver. In the case of a remote control this can be by way of selection by a user. A confirmation of the correct channel can be obtained by receiving a signal from the broadcast receiver, for example using a microphone and comparing the signal with a predetermined signal or a signal received at this apparatus.

However, the device may also contain a radio data receiver, which is used to pick up display data relevant to the programme that the user is currently watching (or listening to). The device is able to filter this incoming data according to the current <medium, channel> pair, which is known to the device.

Incoming display data is stored in memory within the said device until it becomes eligible for display. Generally, such data will be timed to become eligible for display at a point when the programme on the associated channel contains relevant content, (thereby satisfying condition 1) mentioned in the background section); in such a circumstance the display data may be termed programme associated data, or PAD, and the point in time of activation is known as the cue point. The list of PAD items and associated cue points, for each programme broadcast on a given channel (which can include infomercials and commercials, for our purposes) must be provided to a central PAD scheduler, either ahead of time, just in time, or some combination of both. The scheduler co-operates with a database system to hold this list, and, at the appropriate point (either ahead of or at the cue point), passes the next due PAD item, including its cueing information, through to a radio transmission system, which it turn sends it to users' handsets, as rehearsed above.

When a PAD becomes eligible for display and is present in the memory of the said remote control device, it will be caused to be shown on the display of said device, possibly accompanied by certain event indications (such as an audible alarm or flashing lamp).

Various sorts of input signal may be utilized by such a device. For example, a serialized PAD software object may be sent, comprising a program, associated state, unique identifier (PADUID), relevant <medium, channel> specification, and a triggering (cueing) time specification. Control messages may also be sent, to cause PAD items buffered in any appropriate receiving device to be rescheduled, edited, deleted or otherwise manipulated. Simple trigger signals may be sent, to cause any

appropriate receiving device to perform some preset operation. Configuration information may be sent (including software updates for the main device operating routines). "Pure" data may also be sent, devoid of any executable content, such data to be interpreted (and possibly displayed) by software routines resident in any appropriate receiving device.

If the user desires (and the PAD is of a nature so to permit), s/he may interact with the display data by operating controls on the said device. Through this mechanism the user may traverse through a structure of displays, or modify state information associated therewith, under the control of a flow control program embedded in the display data. The user may also move backwards and forwards through the set of display data items which has been received (bounded by the size of the memory) if desired. If a user is particularly interested in a unit of display data, s/he may cause said unit to be stored in non-volatile memory on the said device, from where it may be retrieved by the user for processing at a later time. In normal circumstances, any given unit of display data is eventually evicted from the memory of the device by an incoming unit; this will happen whenever the display data memory is full and the given unit is deemed least eligible to be retained, under some appropriate metric.

User interactions with each unit of display data are stored, and the flow control program contained with each unit may specify at which point (if at all) such interaction data should be forwarded to the sponsor of the display data. When this point is reached, a radio data transmitter in the device is used to send the interaction data back, via a radio service provider, to the central processing station. Here, it is fed into an interaction processor, which is responsible for providing the appropriate response. This may involve initiating a transaction on behalf of the user, possibly via an Internet gateway to the appropriate sponsoring party, requesting that the sponsoring party send more information, logging the interaction in a user database, performing a financial transaction, or otherwise.

In response to the interaction data so transmitted, it is possible for the interaction processor to send back data for the individual consumption of the display data program that initiated the transmission of the interaction data in the first place. This mechanism may be used, for example, to confirm that an order has been received and will be processed.

The central processing station mentioned above may be part of a large network of such stations, which may be arranged in such a manner as to provide transparent 'fail-over' of the transactions of one processing stations to others.

When a transaction is performed using the handset, details of that transaction are stored in non-volatile memory, and a set of the most recent transactions may be displayed to the user on demand. A full record for each user is stored at the central processing station handling that user, and may be downloaded to the handset on demand.

From a user's perspective, the device allows an easy, cheap and hassle-free entry into the world of interactive broadcasting. Services which may be offered include programme-associated selling, schedule information, betting, advertisement follow-up, voting, competitions, audience demographic measurement, interactive story lines, and many others.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of one embodiment of the remote control apparatus of the present invention;

FIGS. 2A through 2L show various exemplary displays of the embodiment of the remote control device of the present invention shown in FIG. 1;

FIG. 3 is a functional block diagram of an interactive system having a preferred embodiment of the present invention;

FIG. 4 is illustration of the embodiment of the remote control device of the present invention shown in FIG. 1, as it might be used to offer programme-associated goods; and

FIG. 5 is a functional block diagram showing the major components of one embodiment of the remote control device of the present invention. Only the major data flows are shown; minor control flows are not.

FIG. 6 is a plan view of an alternative embodiment of the present invention, as a "pass-through" adaptor that may be attached to an existing broadcast receiver remote control handset.

FIG. 7A is a plan view of another alternative embodiment of the present invention, as a device which passively detects the currently selected <medium, channel> pair, and which has no remote control functionality.

FIG. 7B is a plan view of another alternative embodiment of the present invention, as a more restricted form of the device disclosed in FIG. 7A, which relies on user input to set the current <medium, channel> pair.

FIG. 3 is a functional block diagram of an interactive broadcast system embodying the principles of the present invention. The system of FIG. 3 is intended to serve as an example and should not be construed as limiting the invention.

Broadcasters 402 generate content from a number of sources 403, depending on the broadcast medium in use. For example, a television broadcaster might utilise live feed from video cameras, and video played from tape, as primary sources. Commercial broadcasters will also have programmes and segments (such as infomercials and

commercials) provided by sponsors 401, for insertion. In the normal course of events this combined content stream is fed into a transmission mechanism 404 for broadcast to into a user's home 416 where the content carrier is acquired and the content reconstructed and displayed using a broadcast receiver 405. Said transmission mechanism may involve terrestrial radio-frequency broadcast, satellite radio-frequency broadcast, or wired or fibre optic cable transmission, or otherwise. The overall path and system, by means of which content is disseminated from broadcasters 402 to broadcast receivers 405 in users' homes 416, is termed the primary broadcast chain.

For the system of the instant invention to operate, as mentioned above, a rolling 'play list' is compiled for each broadcast channel, containing the PAD display data records and their respective cue points. This information is fed, whether well or only very shortly in advance of the earliest cue point in the segment of the rolling list passed at that time, to a PAD scheduler 411 at a central processing station 420. Such a list may be provided by any combination of the sponsors 401, the broadcasters 402, or by some third party 406 which annotates programmes, either as these programmes are broadcast or ahead of time. The use of third party annotation may be useful where a broadcaster does not wish, or is not correctly placed, to co-operate with the display of programme-associated information. There are a number of circumstances where this might be appropriate; for example, local advertising, advertising making use of products appearing in a feature film, betting on the outcome of events, such as sporting events, and so on. Furthermore, the circumstance may arise, where a sponsor, for example, has an advertisement produced, but does not know at which time such this advert will be shown. In such a case, the transmission signal of the broadcaster in question may be monitored to detect the said advertisement at which point any PAD for that advert may be instantly cued.

In one envisaged embodiment of such a monitoring system, each central processing station contains a database of various audio and/or video samples (supplied ahead of time) taken from the programmes (including advertisement and infomercials) which are to be augmented with data. A matching engine then continuously compares input from

the various broadcast channels with these samples, and uses a commonly known algorithm (such as a sliding-window, averaged, square-of-difference system with an activation threshold) to determine when a 'match' has occurred. Such a system may be utilised to determine that a piece of annotated content is being broadcast at a certain time on a particular <medium, channel> pair, which may in turn allow the scheduler to verify or regain its synchronisation lock for the PAD items for that content. Through the transmission of special control messages, PAD items already sent to user devices may be rescheduled or deleted, without the main body of the message having to be retransmitted.

The possibility of maintaining multiple, alternative lists of PAD items for a given <medium, channel> pair is acknowledged here, with selection of the appropriate list or lists at the user device; however, the primary focus in this exposition will be for the simpler case of a single 'cue list' per pair.

When the next display message is due to be transmitted, as may be detected at the PAD scheduler 411 using either a polling or, preferably, an interrupt mechanism, it is retrieved from a PAD database 408, given a unique identification number (PADUID), and sent to a transmission gateway 413, which may be physically remote, where it is translated into the correct format to be sent over a radio transmission service 414. In the preferred embodiment of the present invention, the PAD would be sent using the text message transmission protocols of a cellular paging system, with a virtual 'recipient address' identified with the pair consisting of the medium and content broadcast channel in question, but other formats are obviously possible. For example, the outbound PAD could be transmitted using 'data-hiding' technology over an existing radio broadcast channel, or sent on a dedicated data radio channel, or otherwise.

From the gateway, the radio service provider 414 arranges for the transmission of the information over the service 414. In the preferred embodiment this involves sending the message using a cellular network of paging transmitters.

The message is received in a given user's home 416 by receiving apparatus 417, which in the preferred embodiment, is a remote control device for said broadcast receiver 405. In the preferred embodiment, the said remote control device 417 will contain a two-way paging chipset to allow reception and transmission of digital information in a ubiquitous and cost-efficient manner. The user 418 utilises the remote control device 417 to select the channel to receive at any given time on a given broadcast receiver 405, and this allows the device 417 to select the appropriate stream of incoming PAD items. In the preferred embodiment, the selected channel and receiver uniquely specify a virtual 'paging user id' to which the said two-way pager chipset may be set to be responsive.

In an alternative envisaged embodiment, data is transmitted to the device using a radio subcarrier scheme, such as is provided by the SCA system in the United States. In another envisaged embodiment, the data transport mechanisms of the Digital Audio Broadcasting (DAB) system are used to transmit information to the device (as defined in ETS 300 401 - "Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to Mobile, Portable and Fixed Receivers").

The internal configuration of the remote control device 417 will be described later. For now, simply note that the device 417 will display the incoming PAD display data to the user at the appropriate cue point, and may accept interaction from the user on the basis of the information so displayed. Details of such interaction, where relevant, may be transmitted back to the central control station 420, together with the unique handset/user id (HUUID) and PADUID of the initial display data. In the preferred embodiment, encoding and transmission is performed by a two-way paging chipset in the remote control device, and picked up by the local cell receiver of a co-operating paging service operator. However, other arrangements for reception of the return radio signal are possible.

For example, the system may make use of bandwidth available within a digital cellular telephony system, under some appropriate protocol (e.g. the Short Message Service of

GSM). Alternatively, the signal may be sent into an unlicensed radio data network, for example, a metropolitan packet-relay system.

In any event, the return signal is picked up by the receiver network 415 of a radio service provider (which may or may not be the same as provider 414), and forwarded to a reception gateway 412. This gateway formats the interaction data in a manner suitable for processing by the rest of the system, and arranges for the translated message to be transported to the appropriate central processing site 420, which may be physically remote.

At the central processing site, the forwarded message is received by an interaction processor 407, which decodes and processes the interaction data. It makes use of the PAD database 408, in conjunction with the enclosed PADUID. The enclosed HUUID is used to look up the user's record in a user database 410. Security mechanisms are incorporated into the message sent from the handset 417 to prevent fraud.

There are a number of possible operations available to the interaction processor upon receipt of a message, and the use of a plug-in architecture here allows this set to be extended at will. Indeed, a separate handler may be registered for each PAD, if desired. In any event, certain common actions will be possible. For example, the user's credit card details may be held in the user database 410 (indeed, if the remote control device is sold to the user by credit card, then this information will be immediately available after the sale), and used, in conjunction with the offer details from the PAD database 408 and vendor details from the vendor database 409 to formulate a financial transaction request, which may then be forwarded to the sponsoring party in question 401. This forwarding may utilise such transports and protocols as are known in the art, and may interface to existing systems installed by the sponsor; for example, the request might be sent over the Internet, using the Secure Electronic Transactions (SET) protocol. Alternatively, the interaction might constitute a request for further information, in which case the sponsor will be so informed. Here, a convenient format may be a 'virtual hit' on the sponsor's Internet Web site, suitably tagged so that the sponsor is aware of

the mechanism through which the interest has been channelled. In yet another common transaction, details are passed back to broadcasters 402, allowing the production of genuinely interactive broadcasts – for example, by allowing feedback voting on a talent contest, or program story line selection.

Through use of an optional home computer 419 connected to the appropriate central processing station 420 over a known transport, such as the Internet, users will be able to review the transaction histories held in the database 410, and have access to all the facilities offered by the handset 417, but in greater detail and with full graphical support. It should be noted that use of a home computer 419 is not necessary to the operation in the main of the present invention.

As the user's name and address is held in the user database 410, the process of purchasing, or requesting the mail-out of information, is greatly simplified.

FIG. 5 is a functional block diagram of an embodiment of the remote control handset according to the instant invention, and FIG. 1 is a plan view of one embodiment of such a handset.

Turning first to FIG. 5, we see that the user of the handset provides input to the device via input system 622, which in one preferred embodiment consists of a set of keys. This input is supplied to the core of a conventional remote control system, 614. This core system may be of any of the configurations well known and rehearsed in the art, such as vendor-specific, universal, learning, programmable, or otherwise. It consists of an input controller, which decodes the data from said input system 622, and invokes the appropriate response in the remote control driver 612. This driver will contain such means, well known in the art (e.g., ROM lookup tables, non-volatile RAM for 'learnt' configurations, etc.), as are necessary for the operation of the device as a remote controller of the required type, and will be connected to infra-red transmitter 613. This will provide an infra-red signal 615, coded appropriately by 612 in response to the user

input from input system 622 as detected by the input controller 611, which, in turn, will drive the remote consumer device (such as a broadcast receiver, VCR, etc).

Depending on the type of remote control device desired, various optional modules may be added to the remote control core 614. For example, a 'learning' remote control would need to have an infra-red receiver 617 connected to the driver 612, in order that inbound infra-red signals 616 from (e.g.) a target handset could be recorded. Similarly, a 'programmable' remote control may require a communications system 628 to allow the appropriate vendor-specific codes to be downloaded from a remote site upon request. According to one preferred embodiment of the present invention, this functionality of system 628 may be provided as a secondary function of the radio data transceiver 603 (described below).

As well as feeding the driver 612 via output 623, the input controller 611 also passes details of the invoked commands to the main processing system 604 within the handset via output 624. This processing system is responsible for dealing with the reception, storage and display of incoming display data, and also handling any interaction with said display data from the user, including (where necessary) causing any resulting interaction data to be transmitted back to the central control system 420.

The main processing system 604 contains a microprocessor 607 (which executes the software components of the user-side system), a real-time clock 626 used to determine (inter alia) when the cueing point of PAD items has been reached, a watchdog timer 629 to reset the system should it become locked up for whatever reason, and various memory components. The latter may be split into: workspace random access memory (RAM) 608, used to hold the ephemeral running state of programs executing on the microprocessor 607, non-volatile RAM 609 used to hold configuration information which must not be lost upon power loss (such as, possibly, HUUUD information, purchase records, display data that the user has requested be stored, and possibly system software or patches), and finally, read-only non-volatile memory (ROM) 610, used to store non-changing information in the system, such as core system software routines.

According to one embodiment of the current system, the functions of all or part of the entire system 604 are provided by an appropriately chosen microcontroller, to reduce cost.

According to another embodiment of the current system, either or both the input controller 611 and the remote control driver 612 are provided by the said microcontroller also, to reduce cost.

The software running on the microprocessor 607 has the responsibility of storing display data pertaining to the currently selected channel of the currently selected broadcast receiver. The microprocessor 607 knows which is the currently selected channel, because it monitors the data 624 sent from the input controller 611; when a channel change is detected, the new <medium, channel> pair is stored in the non-volatile RAM 609. The system software is so arranged that, as soon as may be practicable after the user switches on a broadcast receiver using the device, the microprocessor sends an output along the bus 624 to the input controller 611, to force the transmission of an appropriate infra-red code to the said receiver, to force the selection of a known starting channel.

During operation, the microprocessor 607 may obtain extra information and confirmation about the current <medium, channel> pair, through the optional additional channel confirmation system 625. According to one embodiment of the current invention, this is provided by a microphone and analogue-to-digital (A to D) converter, together with a system which periodically receives a set of expected amplitude value ratings for each <medium, channel> pair from the radio transceiver system 603, and provides a running best match between these using such value-set correlation mechanisms as are well known in the art, such as a sliding-window, averaged, square-of difference system with an activation threshold.

The currently selected <medium, channel> pair affects what information is accepted by the microprocessor from the radio transceiver system 603. According to the preferred embodiment, this will involve sending a control instruction to the pager reception circuitry to make it sensitive only to messages with the appropriate 'virtual' pager user id, corresponding to the said pair.

The radio transceiver system 603 is the main method by which the device communicates with the appropriate central processing station 420, as discussed above. Inbound messages, transmitted as radio signals 618, are picked up by the radio data receiver 601, which functionality in the preferred embodiment will be provided by the reception portions of a two-way pager chipset. Said messages are then passed through the message security system 627, to ensure that they are legitimate. In one embodiment, this process involves decrypting said inbound messages according to a public key algorithm. In another embodiment, it involves comparing a stated checksum on said inbound messages with the same checksum computed dynamically.

Any messages which are picked up and successfully validated by the radio transceiver system 603 are fed to the microprocessor 607, where their <medium, channel> pair is checked against that stored in the non-volatile RAM 609. Those messages which do not match are discarded, whereas those which do match are placed into a buffer in the workspace RAM 608. This buffer clearly has a limited size, and, when the buffer is full and a new message comes in, the PAD item (message) in the buffer with the cue point furthest away from the current time is discarded. Where possible, items which have interactive data stored are not discarded until either a timeout period elapses or the transaction is completed (in which case a summary may be written to the non-volatile RAM 609, and the item discarded if necessary). In the case of a tie, one PAD item is discarded at random. PAD items in the buffer are held in order of cue-up time.

In an envisaged extension to the system, sufficient memory is provided that PAD items for a number of <medium, channel> pairs may be accumulated, not merely the currently selected pair, allowing for information to be instantly available even when the

user skips to a new <medium, channel> pair. The device may keep a record of the most commonly accessed <medium, channel> pairs in non-volatile RAM 609, to help decide upon which PAD items to record.

Each inbound message carries a timestamp which is set at transmission; this allows the real time clock 626 to be accurately maintained in synchronisation by the processor. When the device is used for the first time, messages for any <medium, channel> pair are accepted, in order to quickly acquire an accurate timestamp to initialise the real time clock 626; however, said messages are not retained or displayed unless they do match the current pair.

In another envisaged extension to the system, PAD items contain additional descriptive information - metadata - which allows them to be selectively retained and displayed according to the profile of each particular user. This profile, which may be held in the non-volatile RAM 609, may be used to match PAD to users on criteria such as age, sex, geographical location, and so on.

In yet another envisaged extension to the system, the profiles of users are held, and may to some extent be generated, at the central processing site (420 in FIG. 3). These profiles, stored in the user database (410 in FIG. 3) are matched against metadata-tagged PAD items in the PAD database (408 in FIG. 3). A matching list of users is compiled, and this information (in the form of unique user ids) is appended to the appropriate PAD items prior to transmission. Upon reception at a device, the currently active user id is matched against the said list of users, and only those PAD items which do match are retained and displayed.

Special control messages may also be used, which will force the message corresponding to a specified PADUID to be flushed from the memory of receiving devices, or undergo modification of various types, including change of cue-up time.

The cue point for each PAD item is also specified as a real time point, with an optional special case of 'display immediately' which may be relevant in certain circumstances. The system does not require that PAD items be transmitted from the control centre in the order that they are to be displayed, since this is controlled by the aforementioned cue-up point.

The microprocessor 607 is responsible for initiating a display routine for each PAD item as its cue-up point is reached by the real time clock 626. It will detect such an event either through the use of an interrupt created by the real time clock 626, or by continuous polling. The former mechanism is to be preferred where possible. It may also invoke additional output systems 621 to attract the user's attention to the new display data. In the preferred embodiment of the current invention, such additional output systems will include a piezoelectric buzzer, and a flashing LED. The user may disable these systems if so desired.

The display routine executes the program unit associated with the appropriate PAD item. (In this sense, we may regard the display data as being an object, on which a 'display' method is invoked.) This program unit may make use of a set of core library routines stored in either or both of the ROM 610 and non-volatile RAM 609, to assist its operation. The microprocessor executes display routines using a pre-emptive strategy, to prevent the device becoming locked up due to an endless loop bug in such a routine. The watchdog timer 629 will reset the microprocessor should a bug in the display routine (or some other problem) cause the system to lock up.

To actually generate a display on the device, the display routine of the active PAD item may call various utility library routines, which cause the microprocessor 607 to issue commands to the display system 605. This system contains a display controller 620, responsible for translating the high-level commands sent from the microprocessor 607 into whatever low level display control signals may be required by the actual display system involved 606. In the preferred embodiment of the current invention, the display is rendered as a multi-line pixel-addressed LCD screen.

Other library routines available to an executing display routine provide (inter alia) read and write access to the various memory stores (608, 609 and 610) of the device, allow data to be passed to the input controller 611 via the bus 624, and allow messages to be sent back to the main control centre (and so, possibly, to a sponsoring party, a broadcaster, or otherwise). This latter functionality causes information to be sent to the radio data transmitter 602 of the radio transceiver system 603, having first passed through the message security system 627. According to the preferred embodiment of the current invention, this will involve providing at least a checksum for non-critical outgoing messages, and public-key encryption for critical messages, together with a message digest generated using a special key which makes use, in cyclical series, of a unique list of values held within the non-volatile RAM 609 of the device installed at manufacture and modifiable at later times. Messages are sent from the device using radio emissions 619.

Routines will also exist to allow the display routine to receive information back from the appropriate main control centre in response to a message sent; this cyclical process may continue for as long as necessary. Using further library routines, a display routine may notify the system that the user's interaction has reached a logical ending point, which will allow the PAD item to be flushed if required.

Turning now to FIG. 6, we can see an alternative embodiment of the current invention in which an adaptor unit 701, providing the facilities of the interactive set of controls (3 on FIG. 1) found on the preferred embodiment discussed earlier, can fit over a user's existing remote control unit 704. The "host" handset 704 contains, inter alia, an infra-red transmitter 703, which emits control signals 705 in response to user input. The adaptor unit 701 is so designed that the emitted signals 705 are passed through and permitted to emit from window 702 as signals 706. However, the device 701 also contains an infra-red receiver, which samples the signal 705, allowing the unit to identify the control signal which is being sent. When the control signal represents a command to change the current <medium, channel> pair, the device 701 switches its

PAD display and reception accordingly. The adaptor and host handset are shown in "exploded" form in FIG. 6; in normal use they would be joined together 706.

Turning now to FIG. 1, we can see the controls that would commonly be present on an embodiment of the remote control handset 1 according to the present invention.

The handset controls are split into two major groups. The first set 2 contains controls that are commonly found on conventional remote control devices, and the second set 3 contains controls specific to the interactive and innovative features of the current invention. Commands generated by the device are sent through as infra-red code sequences through the window 17.

Keypad 4 allows for the selection of channels as desired on the current broadcast receiver device, which in turn may be chosen using the keys 8. Controls 5 allow cycling through channels, and level-set controls 6 provide a means to adjust volume, brightness etc. Finally, there is a subset of other controls 7 which perform various functions, such as turning the target broadcast receiver on and off, muting the device, and so on.

In the set of interactive controls 3, we have a multi-line, pixel addressed LCD display 14 on which display data may be shown. Controls 13 and 15 may be exercised to invoke options shown on the screen, at the bottom and sides respectively. For example, in the configuration shown in FIG. 1, pressing the third triangular button from the left would cause the number of items ordered to increment by 1.

Users may traverse through the set of display data in memory using the forward and back keys 12. Newly displayed PAD items may be announced through the use of a piezoelectric buzzer 11 and a flashing LED 10. The 'lock' button 16, if pressed, removes purchasing authority from the handset until the user re-enters his or her PIN code. The 'Buy Now!' button 9 acts as a confirmation button for the current screen. Where no entry has been made on a screen, pressing button 9 will select the default values, if any.

Pressing some combination of keys (such as any two of 15, for example) will bring up a main, master menu allowing navigation to various subscreens.

FIG. 4 illustrates a simple example of an embodiment of the handset remote control device 502 of the present invention in use. Broadcast receiver 501 is displaying a television programme – “The Tool Show” – and as the presenter starts to demonstrate the use of good drilling technique 503, the handset 502 displays a programme-related offer 504 for the drill that the presenter is using. The PAD item corresponding to this offer will have been downloaded to the device from the relevant central processing station 420 (Figure 3) at some point previously, and cued up at the appropriate point for display by the mechanisms rehearsed above.

In order that a better understanding of some of the uses of the handset remote control device of the present invention may be appreciated, some exemplary displays from one embodiment shall now be considered, with reference to FIGS. 2A through 2L. These displays are intended as illustration only and should not be interpreted as limiting the invention.

FIG. 2A illustrates the offer screen of the example from FIG. 4, after some interaction. Line 101 contains a brief description of the product, and line 103 gives pricing information. Indicia 102 shows that there are currently 3 PAD items in memory for the current <medium, channel> pair, of which the currently displayed item is the second. Lines 104 give brief information about the current order and the total cost of that order if actually purchased. Below this are indicators of the functions for the variant selector buttons below (13 on FIG. 1). The ‘BUY’ button 105 will initiate a purchase (similar to pressing the ‘BUY NOW!’ button, 9 on FIG. 1). The ‘INFO’ button 106 will bring up a screen giving further information about the offered product. The variable function buttons corresponding to the ‘+1’ and ‘-1’ labels (107 and 108, respectively) increase and decrease the number of units of the product ordered.

If the user opts to buy, then the screen of FIG. 2C is shown, which contains a request to confirm the transaction 114, a selection of credit and/or debit cards 113 to choose from (chosen by pressing one of the side variable function buttons, 15 on FIG. 1), and the option to cancel the transaction 117. Selecting a credit card will bring up a 'successful order' screen, not shown here.

The screen of FIG. 2B is an example of an offer of information, which might be timed to run alongside an advertisement appearing on the complementary primary broadcast. Here, the user is prompted 109, 111, 112 to press the third from left bottom variable function button (13 on FIG. 1), which will cause a message to be sent back to the sponsor, who will then have the details necessary to send the user an information pack about the product 110. Pressing the 'BUY NOW!' button (9 on FIG. 1) will also have this effect, since it selects the default action on each screen. Once again, we see that the PAD item displayed is one of several 102 (in this case, the last of 4).

Another use of the system is for interactive voting on broadcast content, and FIG. 2D shows how the display might look when this feature is in use. Here, the user is prompted 116 to enter his/her vote for one of the acts 115 (in a talent show, for example), by pressing one of the side variable function buttons (15 on FIG. 1).

Figure 2E illustrates a simple channel guide for the currently selected <medium, channel> pair. A short listing of programmes for the current pair, together with start times, is given 216. A cursor 203 may be scrolled up and down the list using the bottom variable function buttons (13 on FIG. 1) corresponding to 206 and 205 respectively; and it is possible to have a list longer than the screen of which a window is displayed during scrolling, in the familiar manner. Indicia 201 shows the programme currently being broadcast. The current time 202 is shown, along with an indication of the current <medium, channel> pair 215 (in this case, the third channel on a television tuner is selected). The currently selected programme may have further information available about it, in which case label 204 will appear, and the bottom variable function button corresponding to it (from 13 on FIG. 1) may be pressed.

If this is done, a screen such as illustrated in FIG. 2F is displayed. In this instance, information about the selected programme is given 207, and, where this is longer than the screen, the user may scroll up and down through it using the bottom variable function buttons corresponding to labels 209 and 210, respectively. (Note that, in all cases of scrolling, the bottom line containing the function labels remains static). The current time 102 is also shown.

FIG. 2G illustrates how the system may be used as a betting terminal, where the details of the event so bet upon may be broadcast on the currently selected <medium, channel> pair. Here, a simple horse racing screen is shown. The user is prompted to select place a bet and told of the time available so to do 212. Various horses 211 may be selected by pressing the appropriate side variable function button (15 on FIG. 1). Note that this is a simplified example, and in reality, such a system would deal with setting the wager, displaying more information, including a larger number of potential candidates, etc.

When the handset is locked for purchase, by pressing the 'LOCK' button (16 on FIG. 1) or otherwise, the screen shown in FIG. 2H is displayed when a purchase is attempted. Here, the user is prompted 213 to enter a four-digit PIN 214, which will unlock the device. The device may be set to automatically lock if unused for more than a certain period of time. The PIN will be entered using the keypad (4 on FIG. 1).

If the handset is powered down or left unused for a significant period of time, it will revert to a mode in which the user identity must be set, as illustrated in FIG. 2K. Here, the handset has three users within a household 308, Mary, Mike, and Robert. The user is prompted to select his or her identity 309 by pressing the corresponding side variable function button (15 in FIG. 1). Once a user is selected, screen 2H may be displayed for verification. The handset device may utilise a capacitive switch to detect handling and initiate the power on cycle.

In FIG. 7A, we see an alternative embodiment of the current invention, in which no remote control functionality is present. Here, a portable device 801, providing the facilities of the interactive set of controls (3 on FIG. 1) found on the preferred embodiment discussed earlier, and which may also provide conventional pager functionality, contains a microphone 802 by which it continuously monitors its surrounding audio environment. Under normal viewing or listening circumstances, the audio input 803 to microphone 802 will contain a large component due to the programme currently being broadcast on the current <medium, channel> pair.

Having taken a series of audio observations across a short time window, the device performs a sliding match against a set of audio "fingerprints" (which are in turn received periodically from the appropriate central processing station (420 in FIG. 3) via radio link). The matching may use any of the value-series comparison metrics as are known in the art, such as least difference squared summation. If this process yields a unique match to a "fingerprint" of a <medium, channel> pair with sufficient confidence, then that pair will be used to control the current display and acceptance of PAD by the device.

FIG. 7B shows another alternative embodiment of the current invention, in which a portable device 804, similar in most respects to the device of FIG. 7A just considered, requires user input to select the current <medium, channel> pair. The user may cause the device to show display 811, in which s/he is prompted to enter the currently selected medium 809 and channel 810. To perform this selection, the user may move the selection cursors using the variable function buttons corresponding to the "medium" up and down and "channel" up and down labels (805, 806, 808 and 807 respectively). The selected pair is subsequently used to control the display and acceptance of PAD by the device, but does not cause the emission of control signals to a broadcast receiver.

The system may be used with a number of different types of broadcast receiver, and FIG. 2I shows the sort of display that might be shown to accompany radio broadcasts. Details of the current station are shown 301, and an indication of the receiver type 312.

Brief details of the currently playing song, together with the current time, are given 303. As before, a number of PAD items may be held in memory, and the position of the currently displayed item is shown 302. By pressing the bottom variant function key (13 in FIG. 1) corresponding to the 'INFO' label 304, the user may bring up another screen with more information about the current track (not shown here). Pressing the button corresponding to the 'BUY' label 305, or pressing the 'BUY NOW!' button (9 on FIG. 1) will initiate a purchase of the album or single currently playing. In this case, the user will be prompted with further confirmation screens (not shown in detail here).

FIGS. 2J and 2L are given to illustrate some other potential uses of the device, less directly connected with programme-associated material. In FIG. 2J the user is prompted 306 to enter a package tracking code 307 (as used by some document and parcel delivery companies), which may then initiate a remote query to display to the user the current location of the specified package (using screens not shown). Similarly, FIG. 2L illustrates a 'shop from home' usage, in which the user is prompted 310 to enter a joint product/vendor identification code 311. This will initiate a remote query to display information about the product so identified, in a manner similar to that used by PAD product offers (as shown in FIG. 2A, for example); if this is successful the user may initiate a purchase, as with the PAD example discussed previously. In both cases, the details would be entered via the keypad (4 in FIG. 1).

Although illustrative embodiments of the present invention have been described in detail with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments and that changes and modifications may be made by those skilled in the art without departing from the scope and spirit of the invention.

Moreover, any application or patent cited herein should be considered to be incorporated by reference as to any subject matter deemed essential to the present disclosure.

CLAIMS:

1. A communications apparatus comprising means for determining whether a broadcast receiver is receiving a particular channel, the apparatus further comprising receiving means for receiving a signal, means for displaying information in response to a signal received by the receiving means, means responsive to a user input to provide an outgoing signal and transmitting means for transmitting the outgoing signal, wherein at least one of the receiving means and the transmitting means is for communicating by radio with a remote station responsive to outgoing signals from a plurality of communications apparatus.
2. Apparatus as claimed in claim 1, wherein the remote station is distinct from a primary station providing signals to a broadcast receiver.
3. Apparatus as claimed in claim 2, wherein the at least one of the receiving means and transmitting means for communicating with a remote station comprises a means for communicating with a station in a cell of a multi-cell communication system.
4. An apparatus as claimed in claim 3, wherein the multi-cell communication system comprises a paging system.
5. An apparatus as claimed in any one of claims 1 to 4, wherein the means for transmitting the outgoing signal is arranged to transmit the outgoing signal as soon as a user input is complete.
6. An apparatus as claimed in any one of claims 1 to 5, wherein the means for receiving a signal is arranged to receive a signal from a broadcast receiver.
7. An apparatus as claimed in any one of the claims 1 to 6, wherein the means for displaying information is arranged to display information immediately in response to a signal received by the receiving means.

8. An apparatus as claimed in any one of claims 1 to 6, further comprising means for storing a signal received by the receiving means.
9. An apparatus as claimed in claim 8, further comprising time comparison means for controlling display of information in response to a stored signal at a predetermined time.
10. An apparatus as claimed in any one of the claims 1 to 9, wherein the apparatus is portable.
11. An apparatus as claimed in claim 10, wherein the apparatus is a remote control.
12. An apparatus as claimed in claim 11, wherein at least one of the receiving means and the means for displaying information is responsive to alter the information displayed in response to a channel selected using the remote control.
13. An apparatus as claimed in any one of the claims 1 to 9, wherein the means for determining whether a broadcast receiver is receiving a particular channel comprises means for receiving a signal from the broadcast receiver, and means for comparing this signal with a signal received from the receiving means.
14. An apparatus as claimed in any one of the claims 1 to 9, wherein the means for determining whether a broadcast receiver is receiving a particular channel comprises means for receiving a signal from a remote control.
15. An apparatus as claimed in any one of the claims 1 to 14, wherein the means for displaying information is further responsive to the user input.
16. An apparatus as claimed in any one of the claims 1 to 15, wherein the transmitting means is arranged to transmit an encoded authorisation signal.

17. An apparatus as claimed in claims 1 to 16, further comprising security means responsive to a predetermined user input for preventing the transmission of at least part of an outbound signal if the predetermined user input is not correctly provided.

18. An apparatus as claimed in claim 17, wherein the at least part of an outbound signal is the encoded authorisation signal.

19. An apparatus as claimed in claim 14 or claim 15, wherein the security means is responsive to a plurality of different predetermined user inputs.

20. A transmitter apparatus comprising means for storing information concerning transmission from a primary broadcaster, means for transmitting the information and means for synchronising the transmission of information to at least one transmission from the primary broadcaster, wherein the means for transmitting information transmits distinct from the primary broadcast chain.

21. An apparatus as claimed in claim 20, wherein the means for storing the information includes means for storing timing data associated with the information and the means for synchronising the transmission of information is responsive to the stored timing data.

22. An apparatus as claimed in claim 21, wherein the means for synchronising the transmission of information controls the means for transmitting the information to transmit the information before an intended time for display, and to transmit cueing information.

23. An apparatus as claimed in claim 20, further comprising means for receiving a signal from the primary broadcaster, wherein the means for synchronising the transmission of information is responsive to at least one portion of the signal from the primary broadcaster.

24. An apparatus as claimed in any one of the claims 20 to 23, wherein the means for transmitting information comprises a multi-cell communications system..
25. An apparatus as claimed in claim 20, wherein the multi-cell communications system comprises a cellular paging system.
26. A communication system comprising:
transmitter apparatus comprising means for storing information concerning transmission from a primary broadcaster, means for transmitting the information and means for synchronising the transmission of information to at least one transmission from the primary broadcaster, wherein the means for transmitting information transmits distinct from the primary broadcast chain;
apparatus comprising receiving means for receiving a signal from the transmitter apparatus, means for displaying information in response to a signal received by the receiving means, means responsive to a user input to provide an outgoing signal and transmitting means for transmitting the outgoing signal; and
receiving apparatus for receiving the outgoing signal.
27. A communications system as claimed in claim 26, wherein the receiving apparatus further comprises means for storing the received outgoing signal for subsequent processing.
28. Apparatus as claimed in claim 27, wherein the receiving apparatus comprises a station in a cell of a multi-cell communication system.
29. An apparatus as claimed in claim 28, wherein the multi-cell communication system comprises a paging system.

30. An apparatus as claimed in any one of the claims 27 to 29, wherein the means for displaying information is arranged to display information immediately in response to a signal received by the receiving means.

31. A method of communication comprising:

storing information concerning transmission from a primary broadcaster, transmitting the information and synchronising the transmission of information to at least one transmission from the primary broadcaster, wherein the information is transmitted distinct from the primary broadcast chain;

receiving a signal from the transmitter apparatus, displaying information in response to a signal received by the receiving means, providing an outgoing signal in response to a user input and transmitting the outgoing signal; and

receiving the outgoing signal.

32. A method as claimed in claim 31, wherein the transmission distinct from the primary broadcast chain is via a cellular paging system.

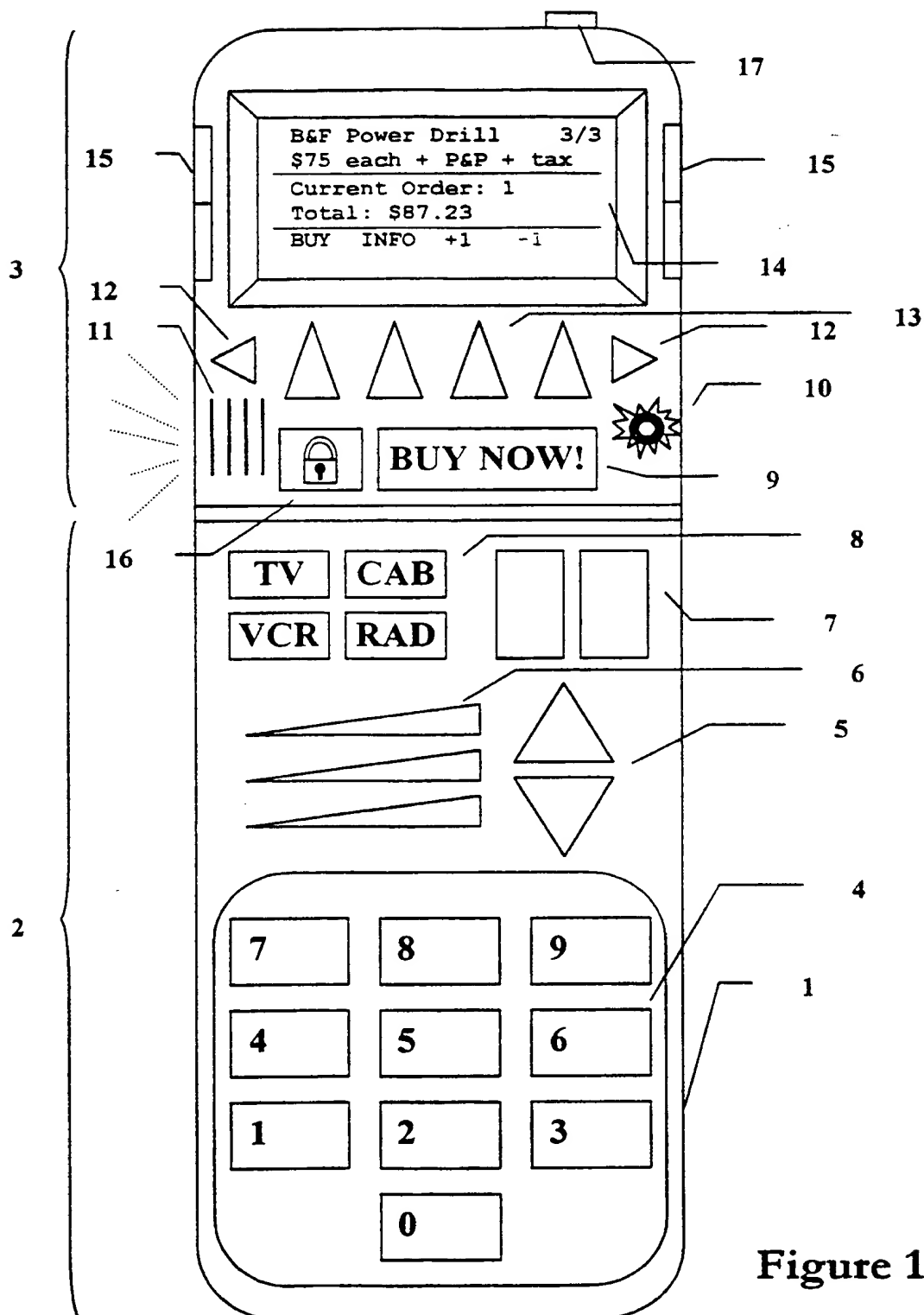


Figure 1

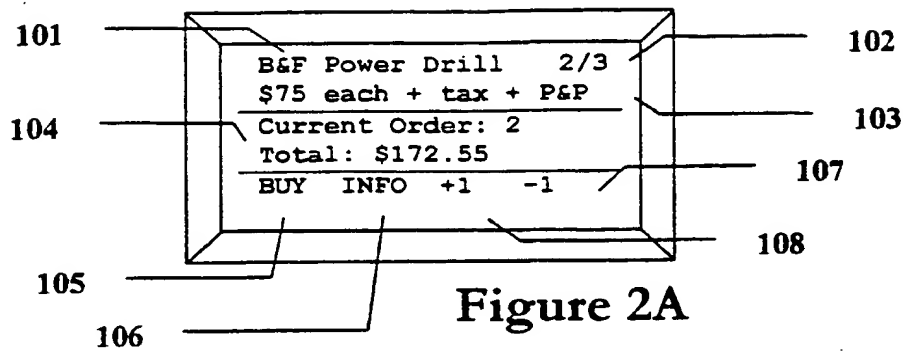


Figure 2A

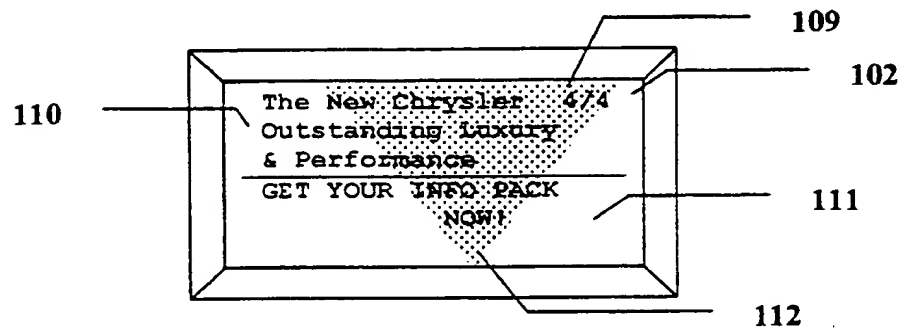


Figure 2B

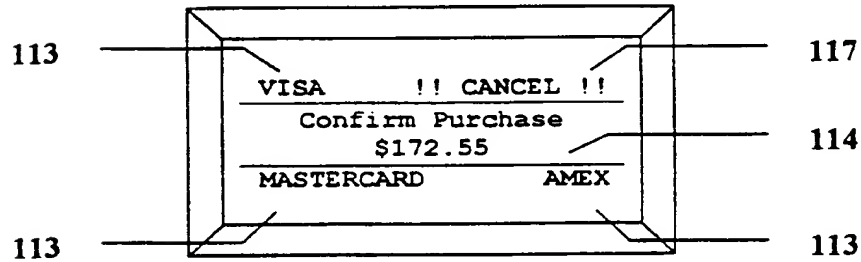


Figure 2C

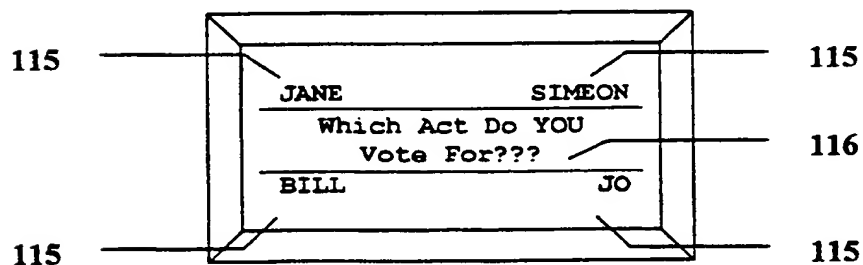


Figure 2D

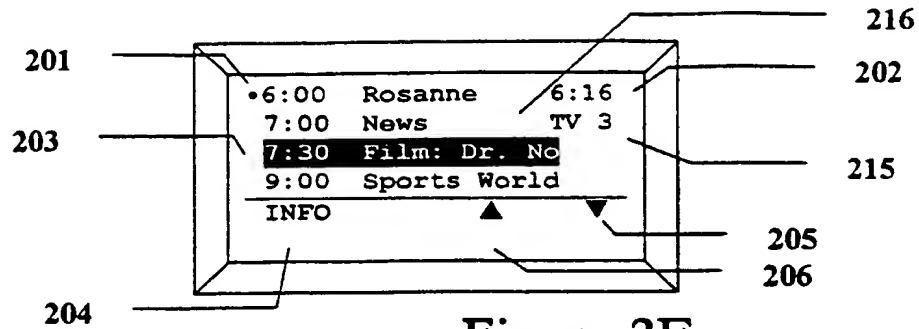


Figure 2E

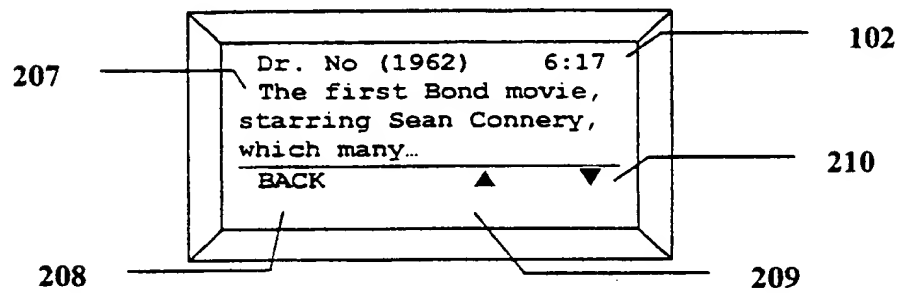


Figure 2F

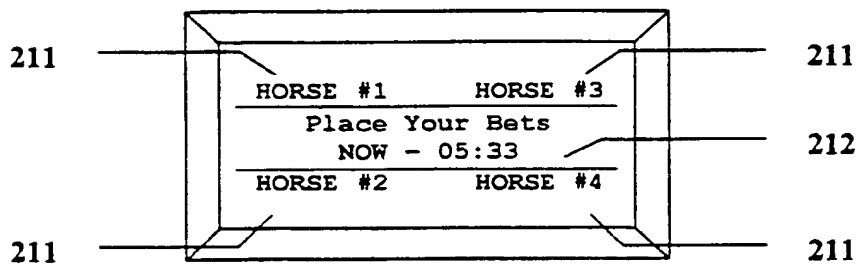


Figure 2G

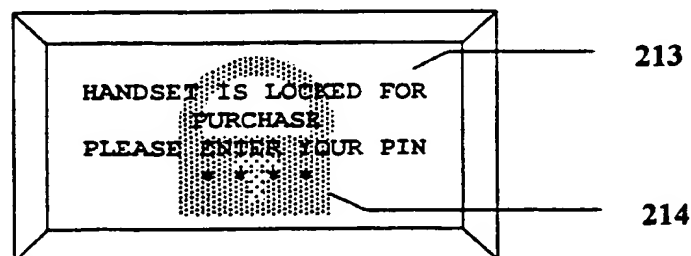


Figure 2H

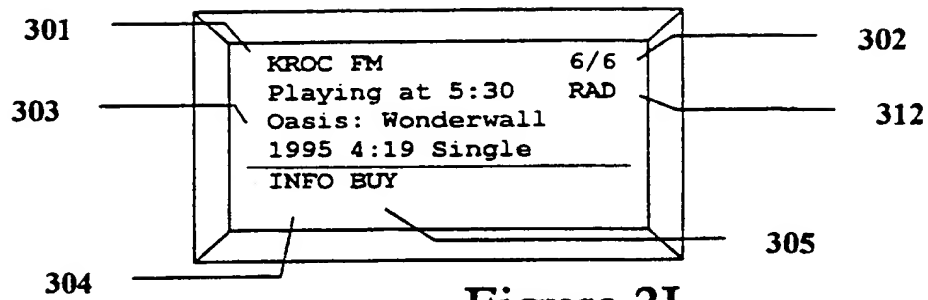


Figure 2I

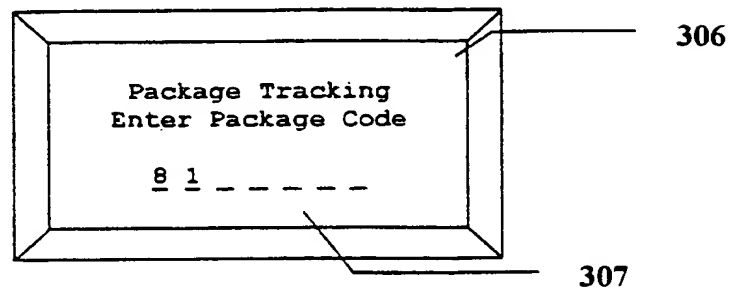


Figure 2J

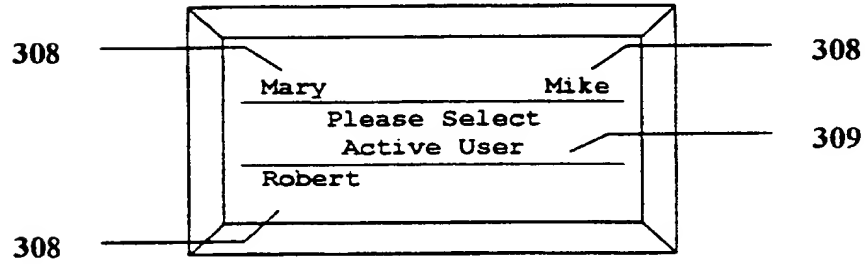


Figure 2K

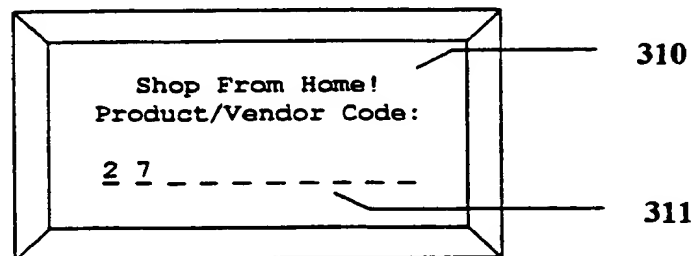


Figure 2L

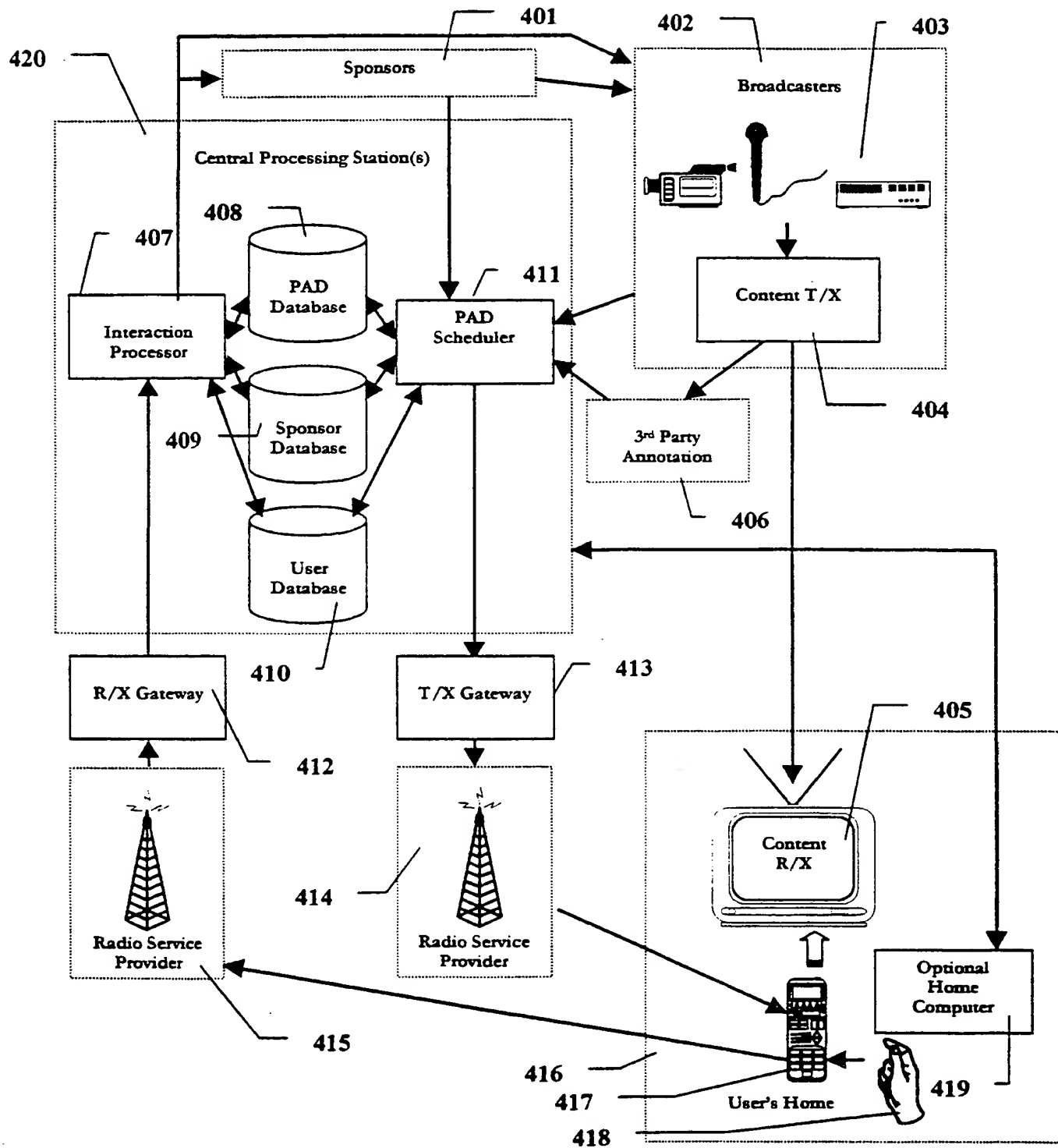


Figure 3

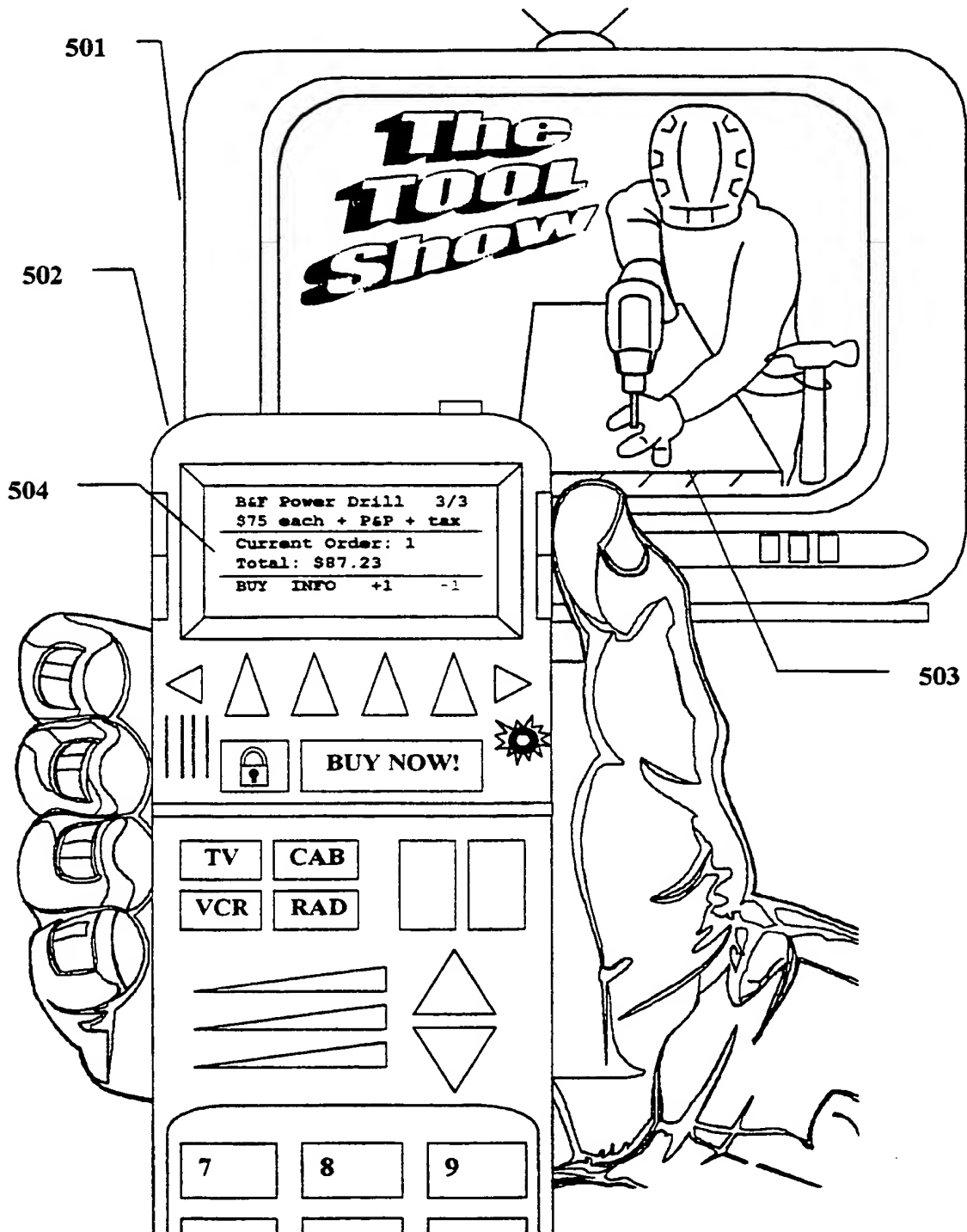
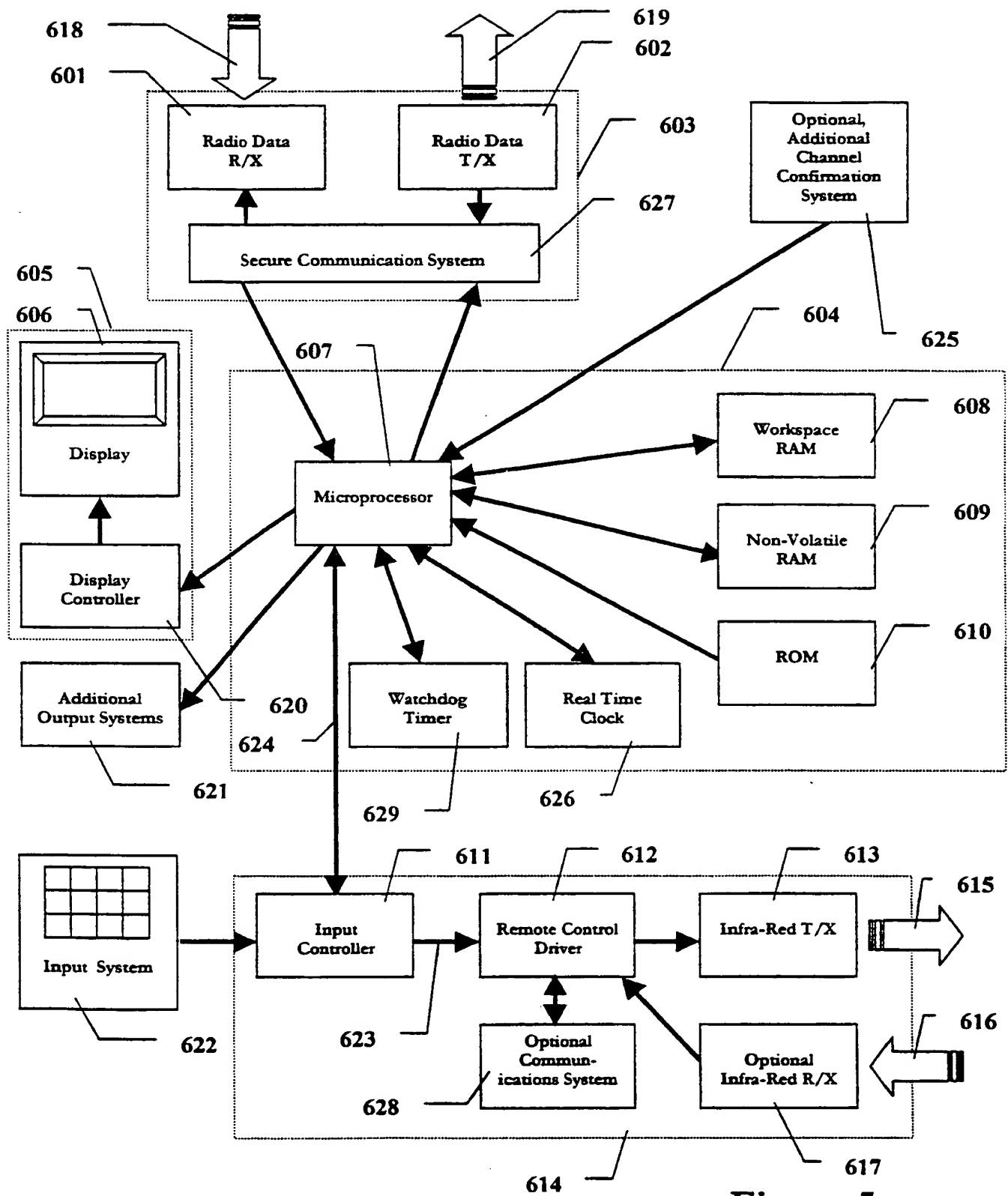


Figure 4



8/9

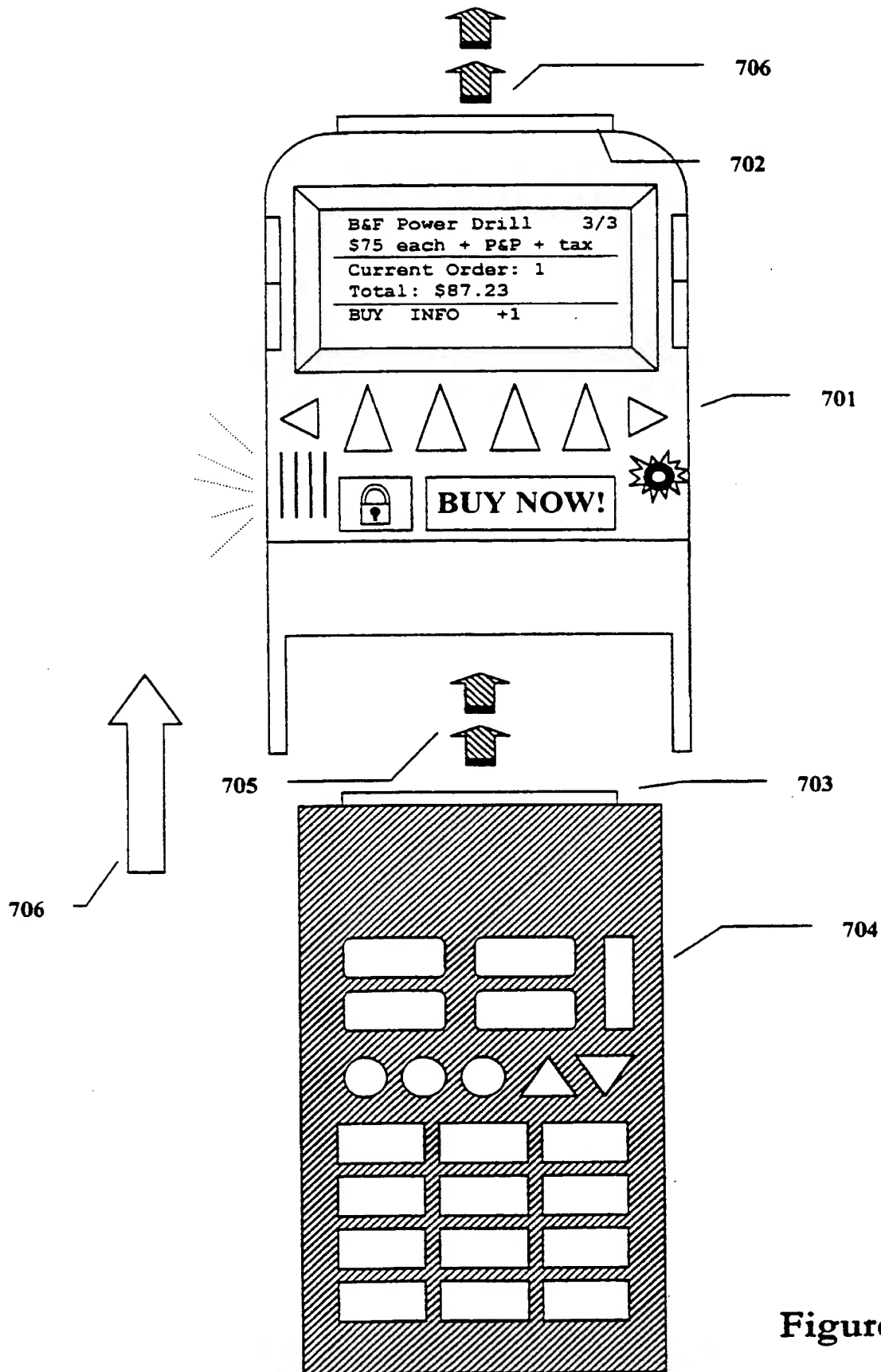


Figure 6

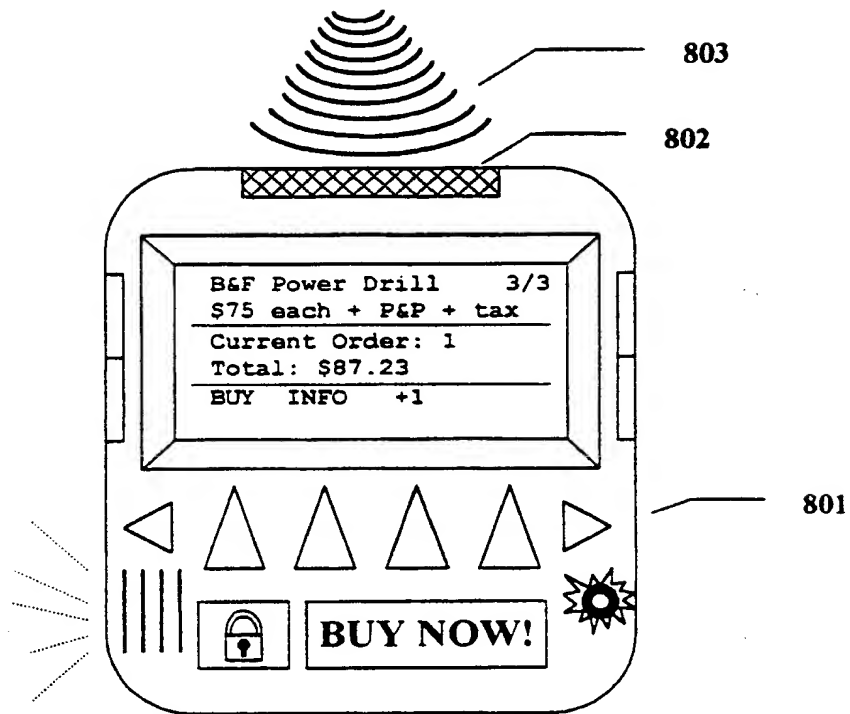


Figure 7A

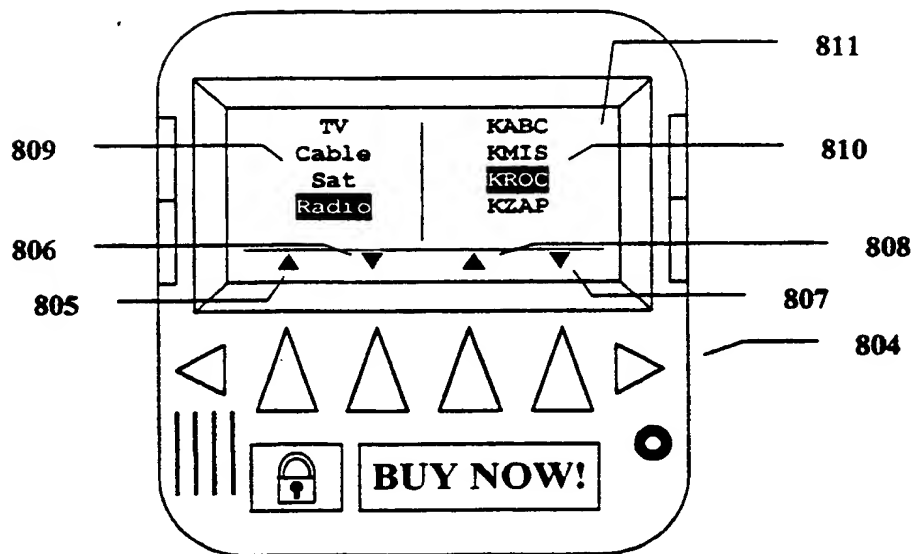


Figure 7B

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 545P77498	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 98/ 02152	International filing date (day/month/year) 20/07/1998	(Earliest) Priority Date (day/month/year) 18/07/1997
Applicant RADIOSCOPE LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. 3 ☐ as suggested by the applicant.

☐ None of the figures.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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EE	Estonia	LR	Liberia	SG	Singapore		

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/02152

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 638 113 A (LAPPINGTON JOHN P ET AL) 10 June 1997 see column 8, line 9 - column 9, line 33; figure 1 ---	1,6-8, 10,11,15 20,26,31
A	WO 96 28903 A (BELL ATLANTIC NETWORK SERVICES) 19 September 1996 see page 15, line 3 - page 18, line 20; figure 4 ---	1
A	GB 2 304 217 A (GEN INFORMATION SYSTEMS LTD) 12 March 1997 see page 4, line 6 - page 6, line 12 see page 7, line 13 - line 23 --- -/--	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

14 October 1998

Date of mailing of the international search report

20/10/1998

Name and mailing address of the ISA

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Authorized officer

Beaudoin, 0

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 98/02152

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 410 326 A (GOLDSTEIN STEVEN W) 25 April 1995 cited in the application see the whole document -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/02152

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5638113	A	10-06-1997	US 5734413 A	31-03-1998
			US 5343239 A	30-08-1994
			AU 1292895 A	19-06-1995
			EP 0740884 A	06-11-1996
			WO 9515654 A	08-06-1995
			AU 661082 B	13-07-1995
			AU 3063292 A	15-06-1993
			CA 2124000 A	27-05-1993
			EP 0613600 A	07-09-1994
			JP 7505020 T	01-06-1995
			WO 9310605 A	27-05-1993
			US 5519433 A	21-05-1996
			US 5526035 A	11-06-1996
			US 5764275 A	09-06-1998
<hr/>				
WO 9628903	A	19-09-1996	US 5651010 A	22-07-1997
			US 5729549 A	17-03-1998
			AU 5365496 A	02-10-1996
			AU 5424496 A	02-10-1996
			AU 5424696 A	02-10-1996
			AU 5424796 A	02-10-1996
			AU 5424896 A	02-10-1996
			AU 5424996 A	02-10-1996
			AU 5425096 A	02-10-1996
			AU 5425296 A	02-10-1996
			WO 9628904 A	19-09-1996
			WO 9628905 A	19-09-1996
			WO 9628906 A	19-09-1996
			WO 9628902 A	19-09-1996
			WO 9628908 A	19-09-1996
			WO 9628909 A	19-09-1996
			WO 9628910 A	19-09-1996
			US 5646942 A	08-07-1997
			US 5559808 A	24-09-1996
			US 5610916 A	11-03-1997
			US 5666365 A	09-09-1997
			US 5751707 A	12-05-1998
<hr/>				
GB 2304217	A	12-03-1997	AU 6706396 A	12-03-1997
			WO 9707632 A	27-02-1997

Information on patent family members

PCT/GB 98/02152

NONE

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/03667

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04H 3/00

US CL : 370/68.1, 73, 94.1, 95.1, 110.1, 112; 348/6, 7, 10, 13; 455/3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 6.1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/68.1, 73, 94.1, 95.1, 110.1, 112; 348/6, 7, 10, 13; 455/3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 6.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,769,833 (FARLEIGH ET AL) 06 September 1988, col. 7, lines 5-20.	1, 16, 27, 31, 43-45
A	US, A, 5,231,494 (WACHOB) 27 July 1993, col. 3, lines 45-62.	43



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be part of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

15 JUNE 1996

Date of mailing of the international search report

01 JUL 1996

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Authorized officer

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PATENT COOPERATION TREATY

From the
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NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year)

17. 09. 99

Applicant's or agent's file reference
545P77498

IMPORTANT NOTIFICATION

International application No.
PCT/GB98/02152

International filing date (day/month/year)
20/07/1998

Priority date (day/month/year)
18/07/1997

Applicant

OTIC LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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Fax: +49 89 2399 - 4465

Authorized officer

Stannartz, B

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 545P77498		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/1PEA/410)	
International application No. PCT/GB98/02152	International filing date (day/month/year) 20/07/1998	Priority date (day/month/year) 18/07/1997	
International Patent Classification (IPC) or national classification and IPC H04N7/173			
Applicant OTIC LIMITED et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 18/02/1999		Date of completion of this report 17. 09. 99	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-82298 Munich Tel. +49 89 2399 - 0 Tx: 523656 eptmu d Fax: +49 89 2399 - 4465		Authorized officer Luckett, P Telephone No. +49 89 2399 5965 	

428 Rec'd PCT/PTO 09/463033
18 JAN 2000INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

International application No. PCT/GB98/02152

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

Description, pages:

1-27 as originally filed

Claims, No.:

1-32 as originally filed

Drawings, sheets:

1/9-9/9 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
☒ claims Nos. 1-32.

because:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB98/02152

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-32 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

- ☒ the claims, or said claims Nos. 1-32 are so inadequately supported by the description that no meaningful opinion could be formed.

- ☐ no international search report has been established for the said claims Nos. .

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

INTERNATIONAL PRELIMINARYInternational application No. **PC/1/GB98/02152****EXAMINATION REPORT - SEPARATE SHEET**

Re Item III**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

- 1 The features of the independent claims are cast in such broad and vague terms that these claims are not deemed to find adequate technical support in the description nor to be adequately clear to enable a fair determination of their intended scope (Art 6, PCT).
- 2 The claims are neither clear nor concise (Art 6, PCT). The number of independent claims and the disparity between their respective subject matter makes it impossible to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection. In order to overcome this objection, it would appear appropriate to file an amended set of claims defining the relevant subject-matter in terms of a minimum number of independent claims in each category followed by dependent claims covering features which are merely optional.
- 3 In as far as their scope can at present be determined, it appears that at least some of the broader claims are either anticipated or rendered obvious by the disclosure of :-

D1: US-A-5 638 113 (LAPPINGTON JOHN P ET AL) 10 June 1997

- 4 It appears that a main advantage arising from the described **embodiments** of the invention should lie in the fact that the service broadcaster need make no special insertions in the service signals normally broadcast. However, the independent claims are wholly silent in this respect so that their vague and broad terms do not exclude systems of the kind known from e.g. D1, in which broadcasters do add extra components to the broadcast signal. The remaining features of the broadest independent claims relate to technical banalities e.g. the definition of a "radio" link as opposed to a any other form of communication link such as a common 2-wire connection independent of the broadcast channels.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/02152

5 The most relevant passages of D1 are at col 9 lines 1-33:-

* The signal received by satellite receiver 26 is sent to the home viewer where it is received by television set 30 and settop device/converter 28. Television 30 plays the original television program. Settop device 28 receives the encoded television signal and strips out the interactive data. Settop device 28 sends the interactive data by infrared transmission to handheld 32, which presents the interactive program to the home viewer. Thus, while the home viewer watches TV 30, the viewer can participate in the interactive program presented on handheld 32. Although infrared transmission is preferred, any other means for transmission will suffice; for example, radio communication or a wire. Transmission via infrared or radio is more efficient than a wire because many viewers, each with their own handheld, can participate simultaneously.

Upon completion of an interactive program the viewer could register his/her score with operations 34, which would be a central or regional office for collecting scores, survey information, etc. Registering can be accomplished utilizing many alternatives. The preferred method for registering scores includes handheld 32 transmitting, via infrared communication, the registration information to dialer 33. After receiving the registration information, dialer 33, which includes a modem, sends the information to operations 34.

Alternative methods for registering scores include a home viewer reading a code from handheld 32 to an operator over conventional telephone lines, the viewer inputting a code into a central computer using the touch tone keys on the telephone, or including a modem inside handheld 32 so that handheld 32 can communicate over the telephone lines with a computer at operations 34. It is also contemplated that a viewer could contact operations 34 via a radio signal, cable or another communication medium." (emphasis added)

Re Item VIII**Certain observations on the international application**

- 6 The independent claim/s/ are not cast in the two part form, with those features which in combination are part of the prior art (see document D1) being placed in the preamble. This is considered to be particularly appropriate in the present case as it is regarded as essential to establishing a clear picture of the contribution made by the applicants vis-a-vis the closely relevant subject matter known from D1.
- 7 The claims do not include reference signs in parentheses. Their inclusion in the claims would enhance claim intelligibility. This applies to both the preamble and

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB98/02152

characterising portion.

- 8 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.